The Construction Wage Determination Process in the 1970's

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The views contained here represent our views and not those of the U.S. Department of Labor. We also accept parentage of the errors which remain in these pages.

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CHAPTER I

Introduction

The nuances of wage determination in the construction industry are poorly understood. The consequence of the failure to understand fully the wage determination process in construction is probably a reduced ability to control inflation throughout the economy. Construction wage increases may contribute to price increases elsewhere in the economy through increasing the cost of capital put in place, and hence prices, through setting patterns which affect the wage increases other workers receive, or both.

The most obvious opportunity for government to intervene in this process and thereby affect inflation is during periods of formal wage control. By government procurement policy, manpower training programs, labor relations involvement, targeted tax incentives, etc., government may and, in fact, does intervene in this process at all times. We do not, however, know whether existing government intervention is optimally designed as an anti-inflation tool since we do not understand the dynamics of construction wage determination well.

The research reported here represents an attempt to better understand wage adjustments in this industry. Our models examine both wage setting in the unionized sector and the interaction between wages in that sector and the unorganized sector. Our work spans the decade of the 1970's. This allows us to examine wage setting in both free and controlled markets.

We have been careful in model development to include both market and institutional variables. We do this because there are two principal theories, complementary in many respects, which are alleged to explain

wage determination phenomena in general and the construction wage determination process in particular. The first is known as the "marginalist" approach or theory. Labor's wages are treated by this approach as any factor payment would be. The other theory, associated with the work of John Dunlop (1957) and others, is known as the contour theory. Contour theory basically argues that a given wage increase in one "key" wage determining unit will be closely mimicked in those wage determining units which are associated with the key unit, i.e., that are members of its contour. Wages in the key unit are held to be determined as traditional marginalist theory suggests. In Chapter II we present a review of the 1970's research literature which addresses wage determination in construction, and this debate in particular.

Cross sectional models of wage change in the unionized sector of the building industry are presented in Chapter III. Three time periods, 1972-73, 1973-74, and 1976-77, are included. In addition to three aggregate models we estimate models for each of 14 crafts. Those crafts are bricklayers, cement masons, carpenters, electricians, iron workers, laborers, plasterers, crane operators, painters, pipefitters, plumbers, roofers, sheet metal workers, and teamsters.

The relationship between craft-union and nonunion wages is explored in Chapter IV. The nonunion wage, total employment, and union employment data are derived from the 1972, 1973, 1976, and 1977 Industry Wage Surveys of construction. Once again, only cross sectional models are estimated.

No time series models are estimated here. We had hoped to estimate such models but data limitations prevented us from so doing. While 20 years of data were available on negotiated construction wages, only nine

years of data (1972-80) were available on our key demand variable, total volume of construction activity. We considered creating a synthetic demand variable from available housing starts data but rejected this. Any failure to exactly replicate the missing volume data would cause a false indication of significance on the wage control variable where the data was spliced together. We could not have known whether our replication was completely successful so we abandoned the time series approach. When this work is combined with the 1974 Construction Industry Stabilization Committee-funded work of Shulenburger, however, intensive cross sectional studies covering the entire 1960-1979 time period exist.

Chapter V comments upon the research presented here. Our finding regarding the demand and supply variables raises some interesting issues about the nature of construction industry wage determination. The value of the newly available data used here in understanding the construction wage setting process is also discussed there. Finally, the findings relating to effects of wage control reported there are apt to be controversial.

CHAPTER II

Construction Industry Wage Determination Research in the 1970's

Introduction

The process of wage determination in the construction industry is a highly complex one which does not always conform to the dictates of orthodox microeconomic theory. A post-World War II history of construction wages reveals a highly expansionary period during the 1950's and 1960's, followed by a control period in the early 1970's during which wage increases were moderated. With the removal of controls the wage explosion, predicted by some, was moderated by an economic recession and the increasing influence of open shop construction.[1]

Recent research into the problem of wage determination in construction has concentrated on two theories. The first is the marginalist theory or market comparison theory which represents standard microeconomic theory. The second is the wage contour theory or hypothesis, originally proposed by John Dunlop.

Marginalist theory holds that wages in construction are determined by the demand for and supply of construction labor; there may also be demographic and institutional variables affecting the wage determination process, such as population, union power, local consumer price index, and so forth.

A wage contour consists of one or more keys or leaders who establish the standard of wage gains and the remaining nonkeys or members of the contour, who attempt to follow the gains established by the key(s). Nonkeys may be associated with certain keys through proximity, through similarity of work tasks, or through long established interrelationships

among the crafts. The wage changes of keys are determined by demand for and supply of construction labor plus other demographic and institutional variables. The wage changes of nonkeys are affected by the demographic and institutional variables that affect the wages of the keys; however, it is hypothesized that the major influence on nonkey wages is the wage change negotiated by the key.

Current Research in Wage Determination in Construction

During the last decade several researchers have attempted to test these two theories of wage determination. D. Q. Mills has published two studies dealing with wage determination by the marginalist approach. D. E. Shulenburger has published two studies examining whether wages of keys are structured primarily by market forces, and whether wages of nonkeys are structured primarily by wages of keys with some influence from other institutional variables. Ross, in an unpublished Ph.D. dissertation, tested a marginalist model, and attempted to determine influences among the crafts which could have represented wage interdependencies. Stephen Welch takes a slightly different marginalist approach by analyzing the effects of substitution of nonunion for union labor on the union-nonunion wage ratio.

Mills (1971) includes the following variables in his marginalist model. The dependent variable is annual percentage change in contract construction wages. The independent variables include percentage change in local contract construction employment, percentage change in local unemployment rate, and dummy variables representing incidence of strikes, upper midwestern region, number of employees covered by the agreement, cities included in the BLS survey of union wages and hours in the building trades, basic construction trades, and mechanical specialty trades.

These variables represent two supply variables, two union power or institutional variables and four demographic variables. Of the demographic variables, the midwest region and the inclusion in the BLS survey could proxy for demand for construction labor. At the time of this early study there was a definite lack of data measuring construction demand, hence, Mills' heavy reliance on indicator variables to measure demand. One would not expect the explanatory power of these variables to be very adequate and would normally like to avoid using them, especially for variables of major importance.

Mills' findings suggest that larger wage increases result when an area experiences a large increase in contract construction employment, when the civilian worker unemployment rate declines significantly, when a strike has occurred, when the relevant crafts are mechanical, and when the craft bargaining unit is relatively large. Because the data, which covered the period 1950-67, are not craft specific it is impossible for Mills to observe any patterns among the various craft wages.

The second study by Mills (1974), initially intended as a replication of the first study with a data set expanded to include the years 1967-1972, resulted in a much poorer model. Mills determined that two additional variables were needed in order to account for the changing trends in wage structure among the crafts and for the wage control period of the early 1970's. Wage structure in construction was measured by the variance of the percentage change in union wages and fringe benefits for 22 crafts in 52 cities over the preceding three-year periods. A time series model was tested including as independent variables annual percentage change in average hourly earnings in nonagricultural industries, change in the construction unemployment rate, lagged one year,

variance of inter-trade wage and fringe benefit packages, and a dummy for the CISC wage control period. Clearly the first three variables are supply variables while the last is an institutional variable.

All the variables had highly significant coefficients. However, because a time series model was used, the number of degrees of freedom was very small. Thus, one would hesitate to make statements about wage determination in general on the basis of the results in Mills' second study.

The Shulenburger studies (1974, 1978) actually test both theories in that he first uses cluster analysis to attempt to identify keys and nonkeys and then regression analysis to test the validity of the classifications. He hypothesizes that the key wage determination process will be closer to the market determinations than the nonkey wage determination process and therefore, that the explained variance for keys should be greater than the explained variance for nonkeys in a standard regression model.

Shulenburger's dependent variable is the time-weighted average annual negotiated wage change expressed in cents-per-hour for a specific local during one wage round. Wage rounds are determined through factor analysis. His independent variables include percentage change in the SMSA's contract construction employment, a ratio of housing starts in the SMSA to contract construction employment in the SMSA, the inverse of the civilian unemployment rate by SMSA, the change in membership for the craft local in the SMSA, the percent of construction workers in the SMSA who are unionized, the percentage change in unionized craft workers, the percent of contract negotiations with strike activity, the absolute deviation of wage ranking of locals in the SMSA from their rank in 1960,

the change in consumer price index, and the population of the SMSA. The change in contract construction employment and the index of housing starts represent demand variables; the unemployment rate and the index of union membership represent supply variables; and the percent and percentage change of unionized construction workers in the SMSA, strike activity, and wage ranking variables are market power variables, with consumer price index and population being demographic variables.

Shulenburger's results indicate support for the idea that variance in the key wage is explained better by supply and demand variables than variance in the nonkey wage. The nonkey wage variance shows the influence of key wage rates, particularly for the plasterers. Because there was no consistent pattern across crafts or time periods, no generalizations about contour behavior were made. The use of cluster analysis to identify the key bargaining units introduces some arbitrariness into the determination; however, the methodology is an improvement on previously performed heuristic methods of key identification.

In his dissertation Ross (1976) attempts to find directional relationships among construction crafts through regression analysis and classification of the resulting coefficients. Ross' dependent variable is percentage change in wages of the specific craft, and his independent variables are unemployment rates, consumer price index, a strike dummy, and the marginal revenue product of construction labor in the basic models and later, additions of lagged values of percentage wage changes by crafts and cities. Given certain values of the relevant coefficients he then attempts to set up flow models of the influences among crafts.

Ross finds most support for his general model, one in which each craft is shown to have some influence on the wage determination processes

of all other crafts in the sample. A severe limitation of this study is the restriction of crafts to the electricians, iron workers, and plumbers. According to Mills (1980) in 1975 these three crafts were ranked first, second, and third by average wage and fringe benefits packages; Ross is forced to conclude that his general interdependence model most accurately describes the wage determination process, i.e., all crafts are influencing all other crafts' wage bargaining; thus, very little is learned about the possible differences between market forces and institutional forces on the wage determination process as a whole. Perhaps if he had chosen three crafts with more disparate rankings (such as plumbers, bricklayers and roofers) some effects of market forces or patterns of contour effects might have been revealed.

Welch's study (1980) is undertaken from a slightly different marginalist perspective. His dependent variable is the log of the union-nonunion wage ratio among six construction crafts. The independent variables are the proportion of unionized persons in each craft, this proportion squared, and dummy variables for crafts and cities. He finds that the two union membership proportions are highly significant and that, among crafts, sheet metal workers and laborers are significant and, among cities, Miami and Denver are significant.

Welch concludes that the relationship between extent of trade union organization and union-nonunion wage differentials is nonlinear and that the wage ratio is at a maximum when the union proportion is approximately 66%. Unfortunately an attempt by Shulenburger et al. to replicate the significance of these results with an expanded data set was unsuccessful. This examination is reported in Chapter IV. It is unclear

why Welch limited himself to only six crafts when 19 more observations could be obtained by including four more crafts.

Additional Independent Variables Discussed in the Current Research

When constructing a marginalist model, several kinds of independent variables are necessary. Obviously supply and demand variables need to be included and the more specific the data for these variables the better explanatory power will be obtained from their inclusion. This section investigates some additional variables that current researchers argue should be included in a complete model of wage determination in construction.

An important class of independent variables that has been largely neglected in previous studies could be termed institutional variables, i.e., variables capturing the effects of government regulation, bargaining structure trends and so forth. It would be desirable to include some institutional variables in the marginalist model which current researchers indicate may have a significant impact on the wage determination process. Major support can be found for the inclusion of variables dealing with the degree of unionization, the occurrence of strike activity at the time of bargaining, current trends in bargaining structure, the degree of labor market sharing between construction and other industries, and the effects of the Davis-Bacon Act.

First, it seems clear that the degree of unionization among crafts has a significant effect on the outcome of wage determination. A cursory examination of nearly all relevant data will show that union wages are higher, almost without exception, than nonunion wages. Several studies have dealt with this issue. Soderstrom (1972) performed a

linear programming analysis of carpenters and determined the elasticity of demand for carpenters' labor. The traditional marginalist argument holds that the smaller the elasticity of demand, the smaller the adverse employment effect of any union-negotiated wage increase, thus, the more freedom the union would have to negotiate larger wage increases. Since the carpenters' elasticity of demand is relatively small, their union negotiators are relatively powerful in the wage bargaining process, and their wages are less subject to supply and demand generated fluctuations. Oaxaca (1975) finds that among craftsmen, regional differences in union wages are smaller than regional differences in nonunion wages. Thus, the pattern of higher union wages seems to prevail over the entire country. Welch (1980) finds that his variable representing proportion of unionization is highly significant although this result seems to be questionable given subsequent research. In light of these findings, a degree of unionization variable might be able to pick up certain institutional qualities that simple supply and demand variables would omit.

A second influence which is directly related to union power and degree of unionization is the occurrence of strikes during the bargaining process. Foster (1978) finds some evidence that strike activity leads to higher settlements and that there has been more strike activity in recent years. Lipsky and Farber (1976) find that there has been an increase in the severity of economic strikes in the last 30 years in construction. Mills (1971) also finds significance in his strike variable reported earlier. Another factor which, according to Mills, makes the strike by one construction craft particularly powerful is the interdependence of the crafts in the construction process. A strike by one craft can ultimately result in a work stoppage by one or more other

crafts, thus exerting even greater pressure on the employer to settle. Thus, there is support for the inclusion of a strike variable.

A third influence on wage determination in construction involves changes in the bargaining structure of construction crafts. It has long been suggested by Dunlop and others that a more centralized bargaining structure would be beneficial in the construction industry. Two types of more centralized bargaining have emerged recently: wide-area bargaining and multicraft bargaining. Hartman and Franke (1980) find that both of these types tend to limit the autonomy of the local and move effective union power to more intermediate levels. They indicate that one of the motives for more centralization is the reduction of strike activity. Since strike activity has been proposed as a relevant institutional variable, coordinated bargaining efforts designed to reduce strike activity should also be included as a determinant in the wage determination process.

A fourth influence on construction wage determination is the effect on construction workers' wages of earnings from outside the construction industry. Bowlby (1980) is able to conclude that the largest proportion of earnings of construction workers from outside the construction industry comes from the manufacturing sector. This finding provides a sound argument for the inclusion of a form of the manufacturing wage rate as a relevant independent variable. Bowlby would like to characterize workers primarily engaged in construction as "regular" workers and those who flow in and out of construction as "casual" workers. The data, however, do not support this conclusion. It seems that it would be more interesting to be able to make these characterizations in terms

of union and nonunion workers. However, it seems that the data do not permit this kind of analysis.

Finally there is the question of the effects of the Davis-Bacon Act on local construction wages. The standard criticism of the Davis-Bacon Act is that it increases the bargaining power of unions, and this in turn increases the relative wages in both sectors of construction. Goldfarb and Morrall (1981) are able to conclude that the Davis-Bacon Act is not economically efficient, but nevertheless, it may be justified on grounds of equity benefits to construction crafts as a whole. Thus, an indicator variable representing areas with coordinated bargaining should be included in the marginalist model.

The study reported here does not deal specifically with skilled-unskilled wage differentials in construction. However, particular attention will be paid to results of craft-specific regressions for laborers and plumbers. Laborers traditionally have the lowest wages in the construction industry while the plumbers are ranked very highly (according to Mills, in 1975 plumbers ranked first). As Gustman and Segal (1974) point out, the skill margin in construction has narrowed during the past 20 years and the causes of this narrowing are not only supply and demand factors but also contour factors, i.e., the desire of unions to negotiate settlements that maintain traditional equity relationships among construction crafts. Thus, the coefficients of the craft-specific regressions for laborers and plumbers will be of particular interest with regard to wage interdependencies.

Footnotes

[1]Foster, H., "Industrial Relations in Construction: 1970-1977," Industrial Relations, Vol. 17, No. 1.

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CHAPTER III

Wage Determination in the Organized Sector

Empirical Specification

The authors' intentions were (a) to develop models of wage determination in the unionized segment of the construction industry, incorporating aspects of both the marginalist and the contour-theoretic wage theories, and (b) to compare the estimates of the model for the period of economic controls (1971-1974) to estimates for the post-control period. Our procedure was a variant of Lewis's Variant B-I.[1] The relative wage effect of unionism itself was subsumed in the constant term (there being no nonunion wages in the data set) and the contributions of economic, bargaining structure, and wage-leadership variables were indicated by their estimated coefficients. Our emphasis on economic variables in wage determination is in the tradition of the Marshall-Hicks analysis of union bargaining power.[2]

Of the possible sources of economic power, we were limited in our specification to those variables available for both control and post-control periods and available for substantial numbers of SMSA's. Thus, some variables which might be expected to influence wage changes were omitted (such as changes in local costs of living, unavailable for all but a few SMSA's) and others were represented by highly imperfect proxies (such as construction strike activity, represented by a measure of the SMSA's overall strike proneness).

In each of the estimates presented, the unit of observation is the craft specific construction local in each of 141 Standard Metropolitan Statistical Areas. Thus, we examined the extent to which geographic

variation in the rate of change in construction union compensation responds to the geographic variation in the independent variables.

Dependent Variable

For each of the periods in question (1972-1973, 1973-1974, and 1976-1977) the dependent variable was the percent change in the dollar value of the total negotiated package (wages plus fringe benefits) from the first third of the first year to the first third of the second year. This variable was chosen as it best represents collective bargaining in most construction situations.

We were concerned with rates of change in negotiated wages and fringes as that (a) is the variable of concern at the bargaining table and (b) was the variable of concern to the Construction Industry Stabilization Committee during the period of economic controls. Use of rates of change, rather than of absolute wage levels, also facilitates comparisons across SMSA's, avoiding issues of unequal wage bases across cities and regions.

Further, the use of first period wages, rather than year-end wages in calculating the rates of change was an important decision. Inspection of contract expiration dates in the files of the Office of Construction Industry Services indicated that the majority of contracts were negotiated during the second third of the year. Many contracts are implemented in "steps," the full effect of the negotiated package not being realized until late in the life of the contract. Thus, the full effect of 1975 negotiations were manifested in the first third of 1976, but (for some contracts) not in the last third of 1975. The effects of 1976 negotiations began to show up in the second third of 1976, but were not (for some contracts) fully manifested until the first third of 1977.

Thus, to measure the full impact of 1976 negotiations, one must compare first third 1976 wages and fringes (which reflect 1975 negotiations) and first third 1977 wages and fringes (which reflect 1976 negotiations).

Independent Variables

Unemployment: We hypothesized that the higher is the rate of unemployment in an SMSA at the time the contract was negotiated, the lower is the rate of change in the compensation package.

Percent change in the manufacturing wage: It was hypothesized that the higher is the rate of change in manufacturing wages over the life of the contract negotiated in construction, the higher is the rate of change in construction compensation. This relationship follows from the ability of construction craftsmen to seek employment in manufacturing as was detailed in the 1980 Annual Construction Industry Report.[3]

Percent change in the dollar volume of construction activity: To the extent that construction wages respond to the derived demand for construction labor, the greater is the rate of change in construction labor, the greater is the rate of change in construction activity, the greater should be the rate of change in construction compensation (the construction volume data used here is that collected by F. W. Dodge).

Percent change in the dollar volume of craft-specific construction activity: For a few of the crafts under consideration, one can identify specific types of construction activity that are of special importance. It was hypothesized that, for those crafts, the higher the rate of change in craft-specific construction activity, the higher would be the rate of change in compensation. The crafts for which such specific forms of construction were identified are shown below with their special activity categories.

Carpenters--wood frame structures
Crane Operators--tall buildings, roads, earth structures
Iron Workers--iron frame structures
Pipe Fitters--pipe projects, pipelines
Teamsters--roads.

Expectation of public sector share: This variable was defined to be the average public sector share of total construction in the SMSA over the period 1972-1979, inclusive. As public sector projects are announced far in advance, and are often of long duration, they should affect the construction labor market prospectively, concurrently,

and retroactively. To the extent that Davis-Bacon requirements alter the local wage structure (both through federal projects and through federally subsidized state and local projects), we hypothesized that the greater is this variable, the greater should be the rate of change in construction compensation.

Percent change in the share of total construction activity accounted for by the public sector: As in the previous variable, this variable was included to account for possible Davis-Bacon effects. We hypothesized that the greater was this rate of change, the greater would be the rate of changes in construction compensation.

Degree of unionization in construction: Following Rosen,[4] we hypothesized that the greater is the degree of unionization of the construction labor force, the greater should be the rate of change in construction compensation. Due to limitations in the data set, the variable employed for all crafts was the proportion of the total construction labor force belonging to unions in 1972.

Strike frequency: Mills found the frequency of strikes in construction to be one of the chief determinants of construction union wages.[5] We were limited in our estimation to using the ratio of total strikes in the SMSA (all industries) to total SMSA strikes in 1971. We hypothesized that the greater was the local propensity to strike, the greater would be the rate of change in construction compensation.

Presence of a Right-to-Work Law: It is often suggested that right-to-work laws serve to weaken unions as institutions. We hypothesized that the presence of a right-to-work law would depress the rate of change in union compensation.

Coordinated bargaining: Hartman and Franke have discussed the encouragement given by the Construction Industry Stabilization Council (and its predecessor) to the consolidation of construction bargaining units.[6] We hypothesized that this encouragement was to make construction agreements easier to police and, at least during the period of controls, would serve to depress the rate of change in construction union compensation. Our source of data was the report on the existence of wide-area and multi-craft agreements by Cullen and Feinberg.[7] Both wide-area and multi-craft agreements were coded as coordinated bargaining, if either applied to the craft local in question.

Regional dummies: Mills found location in the upper Midwest to have a significant effect in increasing the rate of change in construction union compensation.[8] To test

for effects inherent in location in other regions, we included dummies for all regions of the country (the South Atlantic region was omitted, to avoid a singular data matrix, and is, thus, the region against which other regional effects are compared). The definitions of geographic regions are listed in Appendix I. We anticipated that regions experiencing rapid economic growth would show greater rates of change in construction compensation, while the opposite would be true for regions experiencing economic decline.

Plumbers' wage change: Some researchers believe that the key union in a contour is the one most successful in winning wage increases. Inspection of our results indicated that the rate of change of unionized plumbers was consistently greater than the average for all crafts (see Table I). Thus, in one set of regressions, the rate of change of plumbers' wages was included, in addition to economic and bargaining structure variables. We anticipated that this variable would exert an independent effect. That is, plumbers' wages would respond to economic factors and other construction wages would respond to changes in plumbers' wages.

A Note on Estimation

In those cases for which change in manufacturing wages, degree of unionization, or strike frequency were missing from the data base, those variables were entered at their mean values. This procedure produced no bias in the coefficients estimated and preserves the information that would otherwise be lost about effects of the non-missing variables.

The Estimates

The estimated coefficients for our wage change equation are presented in Tables II-IX. Tables II-IV present craft-specific estimates for 1972-1973, 1973-1974, and 1976-1977, respectively; Table V reports estimates for a similar equation, employing the rate of change in plumbers' wages as an independent variable. Tables VI-VIII report estimates for regressions on pooled data (all crafts included), with dichotomous variables representing membership in each craft (cement masons

are the omitted craft). Table IX reports estimates for a similar equation, pooled across crafts (plumbers omitted from the pool) using the rate of change in plumbers' wages as an independent variable.

Looking first at the results for individual crafts, several features of these estimates merit attention. First, the explanatory power of the model is quite low. If one disregards the results for cement masons (for reasons discussed below) the average adjusted R^2's for the years under consideration are: '72-'73, .083; '73-'74, .096; and '76-'77, .117. While these are quite low, we note that, as one would expect, the economic/bargaining structure model explains a greater share of the variance in the dependent variable for the post-control period ('76-'77) than for either of the periods during economic controls ('72-'73 and '73-'74).

In evaluating the estimates reported here, it may be useful to neglect the estimates for cement masons. There were far fewer observations for cement masons than for the other crafts reported. Thus, some of the independent variables were not entered into the regression by our software package, and for the variables entered, there were too few degrees of freedom to generate reliable estimates.

Comparing estimated coefficients and their statistical significances across Tables II-IV, one can see that the role of labor market tightness, as measured by unemployment, is quite small during the period of economic controls, its coefficient being significant for only three crafts in 1972-73 (one of those being cement masons), and for only one craft in 1973-74. For the post-control period, however, unemployment is a significant determinant of the rate of change of compensation for a majority of the crafts considered. In every case in which unemployment

exerted a significant effect on the dependent variable, its sign is as predicted (higher unemployment generating lower rates of change in compensation).

While we anticipated that construction wages would be tied closely to manufacturing wages (and, thus, their rates of change would be highly related), this was not the case. Neither in the period of economic controls nor in the post-control period were rates of change in construction compensation significantly affected by rates of change in manufacturing/wages, except for a small number of the crafts. Perhaps this is because manufacturing wages were more closely tied to nonunion construction wages, which were not included in our data. If manufacturing workers can more easily enter the nonunion construction labor market, this might be the case.

While we anticipated that construction wages would be highly sensitive to the volume of construction activity (and, thus, their rates of change highly related), this was not the case, at least insofar as the volume of construction activity was measured by the data generated by F. W. Dodge Company. We find it difficult to accept that construction wages are not moved by demand for the industry's output, especially in light of the estimated coefficients of our regional dummy variables. Two explanations are possible. First, the Dodge data may simply not reflect true construction volume. We are unable to test this possibility. Second, our aggregation of Dodge county data into SMSA's may not represent relevant labor markets. If construction workers are highly mobile, relevant labor markets may be more nearly statewide or regional than specific to SMSA's. Such extensive labor market areas would be

consistent with our low significance of local building activity measures and high significance of regional effects.

The estimated effect of public sector building on wages, while usually positive (as expected) when significant, was significant in only a few cases. The effect of Davis-Bacon provisions on the rates of change in union wages was not as great as anticipated. While one would anticipate the Davis-Bacon (public sector) variables to be more important in the nonunion sector, we anticipated that public sector building activity would shield union construction workers from nonunion competition, and, thus, generate enhanced bargaining power. This appeared to be the case for only a few crafts, generally those possessing lower degrees of skill.

Of the bargaining structure variables (right-to-work, coordinated bargaining, degree of unionization, and strike frequency), only the coordinated bargaining variable shows any great degrees of significance. In part, this is due to the very imperfect proxies that are used to measure degree of unionization and strike proneness. The results for 1973-1974 (Table III) suggest that coordinated bargaining made union construction wages easier to control, and may account for the CISC's encouragement of multi-craft and wide-area bargaining structures.

The estimated coefficients for our regional dummies are unsurprising. Location in the rapidly growing West South Central and Mountain regions tend to generate larger rates of wage increase during both control and post-control periods.

Note the general unresponsiveness of teamsters' compensation to any construction-specific independent variable in all three periods under consideration. This result suggests that, even for teamsters employed

in construction, wages are based on the markets for intra-city and over-the-road trucking.

When the rate of change of plumbers' compensation is included as an independent variable, little change occurs in the estimated coefficients (see Table V). The signs, estimated values, and levels of significance of the coefficients for virtually all of the crafts in the 1976-1977 regression are left virtually unchanged by adding this additional explanatory variable. The average adjusted R^2, however, increases from 0.117 to 0.152, reflecting the additional explanatory power of this variable.

One source of this explanatory power which must be mentioned is shared, unexplained variance. Most of the variance in each craft's rate of compensation (including that of plumbers) is unaccounted for by our regression equations. If then, these error components are correlated across crafts, introducing plumbers' unexplained variance (embedded in the rate of change of compensation variable) as an independent variable will, necessarily generate a significant coefficient and enhance the adjusted R^2. That this artifact of shared variance is not the dominant effect measured by the coefficient of the plumbers' wage variable is suggested by the fact that not all of the crafts' rates of compensation change are affected significantly by the rate of change of plumbers' compensation. While we hesitate to infer that plumbers are key crafts, whose wage changes are followed by bricklayers, electricians, laborers, pipefitters, and sheet metal workers, such a conclusion is consistent with our estimates.

The generally low degree to which economic and bargaining structure variables seem to affect rates of change in compensation of unionized craft workers is consistent with the "balkanization" suggested by

Kerr and others. That is, craft locals set wages on some equity basis, possibly by following a key local, and let employment in the union sector adjust to the new wage, rather than causation being the reverse. If union workers become disemployed, they then enter the nonunion sector, making it more sensitive to economic conditions than it would otherwise be. Such a hypothesis suggests further research on the nonunion labor segment of the construction industry is needed. Chapter IV of this report represents an attempt to study this issue further.

Tables VI-IX report the results of pooling observations across crafts and introducing craft-specific dummy variables (cement masons is omitted to avoid a singular data matrix). From these results, one can examine further the inter-craft differences in the rate of change of total compensation reported in Table I. One must be cautious in the interpretation of these estimates, however. The results of the F-test for the legitimacy of pooling suggested by Maddala indicate that, in pooling across crafts, much information is lost.[9] That is, the differences in the responses to the independent variables across crafts are statistically significant, and forcing the responses to be uniform (by estimating a single multi-craft equation) generates coefficients that are not representative of the behavior of any single craft's compensation.

The results of these pooled regressions, nonetheless, reflects quite well the results for the individual craft regressions. For the control periods, unemployment is the only economic variable that significantly influences wages. For the post-control, the two Davis-Bacon variables become statistically significant. All of these significant coefficients have the expected signs.

Variables reflecting bargaining structure behave inconsistently over the years. The presence of a right-to-work law exerts a significant positive effect on change in compensation for 1972-1973 only. Coordinated bargaining exerts a significant depressant effect on the dependent variable for 1973-1974 (possibly because such agreements were easy to police), but not for any other year under consideration. Similarly, degree of unionization exerts a depressant effect on the dependent variable in 1973-1974 (perhaps for the same reason). In our results, relative strike frequency never has a significant coefficient. This is contrary to intuition and to the results reported by Mills. We reiterate the dubious nature of the strike variable we were forced to use. Further research on this issue, using the data on construction strikes maintained (but not released) by the Bureau of Labor Statistics may provide further insight.

For 1972-1973, there are no significant differences in the rate of change of compensation across crafts. That suggests that the policy of the CISC was to grant uniform compensation increases to each craft in an SMSA. For 1973-1974, however, there is some evidence that the CISC attempted to restructure the relative wages in each SMSA by granting differential wage increases. In 1976-1977, in the absence of controls, market forces again made differential wage increases obtain.

As shown in Table IX, the coefficients that result from removing plumbers from the sample and using the rate of change in plumbers' wages are very similar to those for the full sample without the additional independent variable. As expected, the estimated coefficient of the rate of change of plumbers' wages is positive and highly significant.

TABLE I

Average Percent Changes in Total Compensation

	1972-73	1973-74	1976-77
All Crafts	7.21	7.83	6.91
Bricklayers	6.59	7.26	5.97
Carpenters	7.92	7.42	7.26
Cement Masons	7.43	5.20	3.89
Crane Operators	7.65	7.66	6.62
Electricians	7.61	7.43	8.16
Iron Workers	7.79	7.55	8.14
Laborers	7.56	8.15	7.01
Painters	7.36	7.63	6.88
Pipefitters	6.49	8.49	7.28
Plasterers	6.96	7.91	6.41
Plumbers	6.47	8.43	7.62
Roofers	6.74	7.99	6.95
Sheet Metal Workers	7.31	8.49	6.34
Teamsters	7.22	7.84	5.75

TABLE II

DETERMINANTS OF THE RATE OF CHANGE OF TOTAL COMPENSATION
1972-1973
(t-statistics in parentheses)

INDEPENDENT VARIABLE	CRAFT													
	Brick-layers	Carpen-ters	Cement Masons	Crane Op-erators	Electri-cians	Iron Workers	Laborers	Painters	Pipe-fitters	Plas-terers	Plumbers	Roofers	Sheet Metal Workers	Team-sters
Constant	0.230	0.071	0.220	0.084	0.072	0.070	0.130	0.051	0.080	0.121	0.073	0.040	0.074	0.158
Unemployment (1972)	-0.001	-0.003	0.003	0.000	-0.000	-0.001	-0.003	-0.000	-0.000	-0.003	-0.000	-0.001	-0.001	-0.002
	(0.55)	(2.18)**	(0.45)	(0.15)	(0.16)	(0.81)	(1.75)*	(0.10)	(0.00)	(1.77)*	(0.18)	(0.53)	(1.03)	(1.47)
% Change in Man. Wage (1972-73)	0.072	0.326	-1.810	-0.146	0.054	-0.472	-0.042	0.122	-0.120	0.232	-0.045	0.368	0.099	-0.375
	(0.23)	(1.22)	(1.76)*	(0.71)	(0.25)	(1.78)*	(0.13)	(0.46)	(0.48)	(0.78)	(0.19)	(1.63)	(0.45)	(1.60)
% Change in Const. Act. (1972-73)	-0.002	0.012	0.025	-0.004	-0.003	-0.002	0.013	0.004	0.001	0.017	-0.003	0.001	-0.002	0.019
	(0.19)	(1.10)	(0.46)	(0.36)	(0.35)	(0.15)	(0.92)	(0.37)	(0.11)	(1.32)	(0.30)	(0.13)	(0.21)	(1.68)*
% Change in Craft-Specific Const. Act. (1972-73)	-	0.000	-	0.001	-	0.000	-	-	-0.000	-	-	-	-	-0.003
		(0.41)		(0.31)		(0.46)			(0.84)					(1.00)
Expectation of Public Sector Share (1972-79)	0.029	-0.006	-0.126	0.014	-0.003	0.054	-0.024	0.032	0.011	-0.060	0.024	-0.030	-0.040	-0.001
	(0.49)	(0.10)	(0.70)	(0.32)	(0.08)	(0.98)	(0.37)	(0.58)	(0.22)	(0.97)	(0.50)	(0.64)	(0.89)	(0.00)
% Change in Public Sector Share (1972-73)	-0.003	0.006	0.044	0.001	-0.004	-0.007	-0.007	0.009	0.001	-0.003	-0.003	0.002	0.001	0.007
	(0.40)	(0.71)	(1.24)	(0.14)	(0.66)	(0.81)	(0.68)	(1.10)	(0.15)	(0.30)	(0.39)	(0.03)	(0.09)	(0.92)
Degree of Unionization	0.011	-0.037	-0.167	-0.024	0.016	0.015	-0.009	0.010	-0.022	0.001	-0.008	0.013	0.012	-0.051
	(0.38)	(1.32)	(1.38)	(1.11)	(0.73)	(0.54)	(0.27)	(0.33)	(0.84)	(0.04)	(0.35)	(0.54)	(0.53)	(2.07)**
Relative Strike Frequency $(\frac{1972}{1971})$	0.000	-0.003	0.036	-0.002	0.004	0.010	0.003	-0.004	-0.008	-0.002	-0.006	0.002	0.004	-0.013
	(0.00)	(0.31)	(0.54)	(0.27)	(0.55)	(1.16)	(0.26)	(0.41)	(0.97)	(0.21)	(0.77)	(0.33)	(0.05)	(1.61)
Right-to-Work Law	0.027	0.014	-	0.019	0.012	0.007	-0.003	0.011	0.006	-0.10	-0.000	0.010	0.009	-0.010
	(2.02)**	(1.11)	(1.97)	(1.97)	(1.12)	(0.54)	(0.17)	(0.90)	(0.49)	(0.69)	(0.00)	(0.89)	(0.82)	(1.23)
Coordinated Bargaining	0.007	0.011	-0.001	0.006	-0.020	0.017	-0.016	-0.014	-0.002	-0.011	-0.000	0.002	0.009	-0.010
	(0.67)	(1.19)	(0.00)	(0.86)	(2.70)***	(1.80)*	(1.44)	(1.51)	(0.22)	(1.10)	(0.05)	(0.19)	(1.12)	(1.23)
New England	0.043	0.043	0.055	0.003	0.044	0.019	-0.016	0.010	0.023	-0.015	0.012	0.019	0.001	0.007
	(2.35)**	(2.44)**	(0.79)	(0.25)	(3.08)***	(1.09)	(0.78)	(0.56)	(1.37)	(0.76)	(0.76)	(1.29)	(0.02)	(0.43)
Middle Atlantic	0.025	0.004	0.049	-0.008	-0.004	-0.008	-0.017	0.030	0.001	-0.020	-0.014	0.007	0.001	0.004
	(1.54)	(0.27)	(0.60)	(0.71)	(0.28)	(0.50)	(0.89)	(2.00)**	(0.07)	(1.56)	(1.00)	(0.52)	(0.09)	(0.28)
East North Central	0.009	-0.002	-0.038	0.001	-0.005	-0.017	-0.038	-0.005	0.007	-0.045	-0.004	-0.008	-0.030	-0.010
	(0.52)	(0.10)	(0.54)	(0.04)	(0.38)	(1.05)	(1.90)*	(0.31)	(0.47)	(2.45)**	(0.27)	(0.56)	(2.23)**	(0.70)
West North Central	0.005	-0.002	-	-0.025	-0.015	-0.013	-0.022	-0.011	0.003	-0.016	0.002	0.005	-0.020	-0.015
	(0.28)	(0.10)		(1.93)*	(1.09)	(0.80)	(1.07)	(0.69)	(0.18)	(0.84)	(0.11)	(0.35)	(1.42)	(1.03)
East South Central	-0.012	0.002	-	-0.012	0.005	-0.030	-0.022	0.011	-0.002	-0.019	-0.003	0.013	-0.008	-0.014
	(0.53)	(0.11)		(0.71)	(0.28)	(1.34)	(0.89)	(0.51)	(0.08)	(0.75)	(0.14)	(0.68)	(0.47)	(0.73)
West South Central	0.018	0.028	-	0.022	0.001	0.007	0.017	0.028	0.020	0.009	0.015	0.036	0.015	-0.015
	(1.13)	(1.81)*		(1.88)*	(0.11)	(0.51)	(0.92)	(1.96)**	(1.40)	(0.54)	(1.16)	(2.76)***	(1.21)	(1.15)
Mountain	0.026	0.038	-	0.007	0.012	-0.007	-0.004	0.032	0.022	-0.017	0.018	-0.003	0.055	0.009
	(1.03)	(1.58)		(0.36)	(0.60)	(0.28)	(0.15)	(1.37)	(0.98)	(0.63)	(0.85)	(0.17)	(2.79)***	(0.42)
Pacific	0.034	0.068	-	0.015	0.004	0.023	-0.009	0.023	0.015	-0.037	0.004	-0.000	0.007	0.011
	(1.65)*	(3.53)***		(1.01)	(0.23)	(1.38)	(0.39)	(1.20)	(0.78)	(1.70)	(0.26)	(0.00)	(0.43)	(0.91)
R^2	0.12	0.31	0.35	0.25	0.30	0.20	0.19	0.15	0.08	0.19	0.09	0.20	0.31	0.17
$\bar{R}^2$	-0.00	0.21	-0.07	0.14	0.21	0.08	0.08	0.04	-0.06	0.07	-0.04	0.08	0.22	0.05
F	1.00	3.03	0.84	2.24	3.13	1.71	1.74	1.31	0.56	1.66	0.68	1.76	3.31	1.44
n of observations	141	141	29	141	141	141	141	140	141	141	140	141	141	141

*Signif. at .10 level; **signif. at .05 level; ***signif. at .01 level.

TABLE III

DETERMINANTS OF THE RATE OF CHANGE OF TOTAL COMPENSATION
1973-1974
(t-statistics in parentheses)

INDEPENDENT VARIABLE	CRAFT													
	Brick-layers	Carpen-ters	Cement Masons	Crane Op-erators	Electri-cians	Iron Workers	Laborers	Painters	Pipe-fitters	Plas-terers	Plumbers	Roofers	Sheet Metal Workers	Team-sters
Constant	0.050	0.120	0.052	0.051	0.057	0.087	0.087	0.088	0.052	0.080	0.034	0.081	0.090	0.110
Unemployment (1973)	-0.003	-0.003	-0.001	0.002	0.003	-0.001	0.001	-0.006	0.001	-0.000	0.001	0.004	-0.001	-0.000
	(1.29)	(1.53)	(0.49)	(0.74)	(1.51)	(0.41)	(0.28)	(2.29)**	(0.24)	(0.07)	(0.27)	(1.17)	(0.46)	(0.03)
% Change in Man. Wage (1973-74)	0.058	-0.337	0.010	0.106	-0.083	-0.127	0.023	0.151	0.000	0.039	0.053	0.042	-0.248	0.007
	(0.37)	(2.40)**	(0.04)	(0.51)	(0.65)	(0.88)	(0.11)	(0.87)	(0.00)	(0.17)	(0.31)	(0.18)	(1.23)	(0.03)
% Change in Const. Act. (1973-74)	0.004	-0.005	-0.013	0.000	0.004	-0.005	-0.002	-0.001	0.009	-0.004	0.009	-0.009	0.003	-0.000
	(0.88)	(1.22)	(0.98)	(0.03)	(1.03)	(1.08)	(0.28)	(0.27)	(1.75)*	(0.51)	(1.73)*	(1.31)	(0.52)	(0.00)
% Change in Craft-Specific Const. Act. (1973-74)	-	-0.002	-	-0.002	-	-0.001	-	-	-0.001	-	-	-	-	0.000
		(2.24)**		(0.32)		(0.97)			(1.27)					(0.54)
Expectation of Public Sector Share (1972-79)	-0.004	-0.017	0.047	0.018	0.033	0.035	-0.012	0.020	0.072	0.039	0.112	-0.004	-0.007	-0.041
	(0.09)	(0.40)	(0.92)	(0.28)	(0.84)	(0.77)	(0.19)	(0.37)	(1.40)	(0.54)	(2.07)**	(0.07)	(0.12)	(0.40)
% Change in Public Sector Share (1973-74)	-0.004	0.004	-0.023	0.006	0.002	0.015	-0.003	-0.018	0.007	-0.006	0.004	-0.006	0.004	-0.014
	(0.64)	(0.75)	(2.53)**	(0.67)	(0.31)	(2.69)***	(0.42)	(2.64)***	(0.95)	(0.65)	(0.63)	(0.64)	(0.47)	(0.96)
Degree of Unionization	-0.018	-0.003	-0.033	-0.004	-0.008	-0.030	-0.044	-0.026	-0.034	-0.040	-0.023	0.007	0.002	-0.014
	(0.78)	(0.16)	(0.90)	(0.12)	(0.41)	(1.41)	(1.44)	(0.98)	(1.34)	(1.13)	(0.91)	(0.19)	(0.07)	(0.28)
Relative Strike Frequency $(\frac{1973}{1971})$	0.000	-0.003	0.023	0.001	0.010	-0.013	-0.004	0.001	0.018	-0.016	0.019	0.008	0.002	0.018
	(0.03)	(0.30)	(1.81)*	(0.09)	(1.18)	(1.41)	(0.34)	(0.13)	(1.66)*	(1.05)	(1.73)*	(0.57)	(0.14)	(0.90)
Right-to-Work Law	0.036	-0.001	-	-0.013	0.014	0.004	0.004	0.004	0.015	0.007	0.009	-0.021	0.000	0.016
	(3.17)***	(0.14)		(0.87)	(1.54)	(0.41)	(0.28)	(0.35)	(1.22)	(0.39)	(0.68)	(1.25)	(0.03)	(0.66)
Coordinated Bargaining	0.018	0.001	0.002	-0.014	-0.015	0.005	0.012	0.014	-0.027	0.010	-0.022	-0.033	0.009	-0.037
	(2.23)**	(0.14)	(0.21)	(1.28)	(2.33)**	(0.61)	(1.15)	(1.63)	(3.12)***	(0.89)	(2.52)**	(2.82)***	(0.82)	(2.28)**
New England	0.026	-0.004	0.002	0.032	-0.016	0.003	-0.020	0.030	0.005	-0.015	0.001	-0.019	0.014	-0.040
	(1.67)*	(0.31)	(0.12)	(1.57)*	(1.24)	(0.23)	(1.01)	(1.74)*	(0.31)	(0.63)	(0.03)	(0.85)	(0.70)	(1.26)
Middle Atlantic	0.011	0.003	-0.010	-0.000	0.003	0.007	0.005	-0.001	0.021	0.005	0.001	-0.011	0.022	-0.010
	(0.81)	(0.29)	(0.59)	(0.03)	(0.31)	(0.57)	(0.26)	(0.07)	(1.49)	(0.24)	(0.09)	(0.59)	(1.29)	(0.35)
East North Central	0.024	-0.006	-0.018	0.015	0.007	0.008	0.001	0.001	0.042	0.013	0.032	-0.010	-0.000	0.018
	(1.65)*	(0.46)	(0.86)	(0.79)	(0.62)	(0.63)	(0.04)	(0.03)	(2.73)***	(0.61)	(2.03)**	(0.49)	(0.00)	(0.59)
West North Central	0.033	0.015	-	0.020	0.005	0.025	0.041	0.010	0.029	0.010	0.024	0.007	-0.003	0.031
	(2.21)**	(1.11)		(1.02)	(0.37)	(1.80)	(2.11)**	(0.62)	(1.79)*	(0.46)	(1.44)	(0.33)	(0.14)	(0.99)
East South Central	0.027	0.041	-	0.038	-0.023	0.035	0.007	-0.011	0.074	0.010	0.073	0.015	0.006	0.040
	(1.45)	(2.41)**		(1.53)	(1.46)	(1.99)**	(0.30)	(0.52)	(3.61)***	(0.35)	(3.53)***	(0.53)	(0.24)	(1.01)
West South Central	0.008	0.020	-	0.016	0.005	0.002	0.030	0.001	0.014	0.036	0.013	0.017	-0.003	0.022
	(0.61)	(1.74)*		(0.93)	(0.48)	(0.14)	(1.73)*	(0.06)	(1.02)	(1.82)*	(0.91)	(0.87)	(0.17)	(0.78)
Mountain	-0.001	0.061	-	0.060	0.033	0.019	0.021	0.020	0.034	0.032	0.036	0.007	0.050	0.020
	(0.07)	(3.41)***		(2.20)**	(1.95)*	(1.00)	(0.76)	(0.88)	(1.53)	(1.05)	(1.59)	(0.24)	(1.90)*	(0.49)
Pacific	0.061	0.017	-	0.006	0.002	0.046	0.044	0.023	0.082	0.051	0.076	0.023	0.066	0.017
	(3.49)***	(1.11)		(0.25)	(0.11)	(2.85)***	(1.91)*	(1.19)	(4.25)***	(1.92)*	(3.91)***	(0.88)	(2.87)***	(0.48)
R^2	0.26	0.25	0.63	0.14	0.18	0.21	0.20	0.14	0.34	0.14	0.31	0.18	0.20	0.14
$\bar{R}^2$	0.16	0.14	0.39	0.02	0.07	0.09	0.09	0.02	0.24	0.03	0.22	0.07	0.09	0.02
F	2.60	2.28	2.61	1.13	1.58	1.79	1.86	1.14	3.47	1.21	3.28	1.62	1.80	1.13
n of observations	141	141	29	141	141	141	141	141	141	141	140	141	141	141

*Signif. at .10 level; **signif. at .05 level; ***signif. at .01 level.

TABLE IV

DETERMINANTS OF THE RATE OF CHANGE OF TOTAL COMPENSATION
1976-1977
(t-statistics in parentheses)

INDEPENDENT VARIABLE	CRAFT													
	Brick-layers	Carpen-ters	Cement Masons	Crane Op-erators	Electri-cians	Iron Workers	Laborers	Painters	Pipe-fitters	Plas-terers	Plumbers	Roofers	Sheet Metal Workers	Team-sters
Constant	0.046	0.076	0.098	0.064	0.058	0.069	0.072	0.040	0.054	0.063	0.049	-0.020	0.070	0.108
Unemployment (1976)	-0.004 (2.42)**	-0.005 (3.13)***	-0.010 (2.27)**	0.000 (0.34)	0.002 (0.89)	-0.003 (2.05)**	-0.003 (5.784)***	0.001 (0.46)	-0.003 (1.71)*	-0.002 (1.07)	-0.005 (2.09)**	0.002 (0.50)	-0.004 (1.58)	-0.008 (1.75)*
% Change in Man. Wage (1976-77)	0.157 (1.02)	0.278 (1.79)*	0.405 (0.92)	0.090 (0.69)	0.215 (1.20)	0.194 (1.20)	0.226 (1.43)	0.154 (0.76)	0.408 (2.71)***	0.279 (1.54)	0.265 (1.07)	-0.190 (0.46)	0.218 (0.91)	-0.499 (1.10)
% Change in Const. Act. (1976-77)	0.001 (0.20)	0.004 (1.48)	0.007 (1.36)	-0.004 (1.46)	0.001 (0.41)	-0.003 (1.20)	0.002 (0.78)	-0.003 (0.92)	0.001 (0.18)	0.003 (0.91)	0.016 (3.35)***	-0.005 (0.71)	0.004 (1.00)	-0.006 (0.65)
% Change in Craft-Specific Const. Act. (1976-77)	-	-0.001 (1.04)	-	0.002 (0.66)	-	-0.000 (0.28)	-	-	0.000 (1.19)	-	-	-	-	0.003 (0.54)
Expectation of Public Sector Share (1972-79)	0.071 (1.49)	0.037 (0.78)	-0.075 (0.71)	-0.005 (0.12)	-0.025 (0.46)	0.057 (1.14)	0.014 (0.30)	0.042 (0.68)	-0.056 (1.22)	0.008 (0.14)	0.020 (0.25)	0.083 (0.66)	0.154 (2.13)**	0.045 (0.32)
% Change in Public Sector Share (1976-77)	0.001 (0.65)	0.002 (1.10)	0.010 (0.93)	-0.001 (0.96)	0.001 (0.66)	0.001 (0.94)	0.006 (3.56)***	0.001 (0.49)	-0.000 (0.28)	0.006 (2.96)***	0.001 (0.28)	0.002 (0.50)	0.006 (2.23)**	-0.004 (0.80)
Degree of Unionization	0.012 (0.55)	0.007 (0.30)	0.003 (0.05)	-0.014 (0.74)	0.021 (0.79)	-0.009 (0.40)	0.009 (0.41)	-0.005 (0.15)	0.034 (1.57)	0.017 (0.67)	0.029 (0.81)	0.005 (0.09)	-0.029 (0.85)	-0.086 (1.30)
Relative Strike Frequency $(\frac{1976}{1971})$	-0.004 (0.45)	-0.009 (1.20)	0.010 (0.48)	-0.005 (0.78)	0.007 (0.73)	-0.008 (0.94)	-0.007 (0.90)	0.006 (0.55)	-0.007 (0.90)	-0.010 (1.06)	-0.005 (0.42)	0.016 (0.79)	-0.012 (0.99)	0.005 (0.24)
Right-to-Work Law	-0.015 (1.40)	-0.005 (0.47)	-	0.003 (0.31)	-0.007 (0.59)	0.009 (0.81)	0.022 (1.91)**	-0.026 (1.81)*	0.021 (1.97)**	0.011 (0.84)	0.021 (1.14)	0.007 (0.25)	-0.018 (1.05)	-0.022 (0.67)
Coordinated Bargaining	0.000 (0.03)	0.003 (0.42)	0.001 (0.05)	-0.000 (0.03)	-0.016 (1.78)*	-0.002 (0.18)	-0.008 (0.97)	-0.000 (0.04)	0.012 (1.54)	-0.007 (0.84)	0.017 (1.35)	0.020 (0.95)	-0.005 (0.38)	0.024 (1.05)
New England	-0.007 (0.53)	-0.019 (1.33)	0.007 (0.31)	-0.022 (1.77)*	-0.017 (1.00)	0.045 (2.98)***	-0.007 (0.46)	-0.024 (1.27)	-0.009 (0.69)	-0.025 (1.52)	0.031 (1.32)	0.024 (0.63)	-0.043 (1.94)*	-0.027 (0.64)
Middle Atlantic	-0.002 (0.17)	-0.003 (0.21)	0.024 (0.81)	-0.001 (0.08)	-0.010 (0.65)	0.005 (0.42)	-0.000 (0.00)	-0.019 (1.14)	-0.004 (0.37)	-0.017 (1.10)	0.005 (0.25)	-0.017 (0.50)	-0.032 (1.59)	-0.028 (0.74)
East North Central	0.008 (0.64)	-0.006 (0.42)	0.002 (0.06)	0.007 (0.63)	-0.022 (1.39)	0.009 (0.65)	0.008 (0.56)	-0.002 (0.12)	-0.017 (1.32)	-0.006 (0.36)	-0.009 (0.40)	0.046 (1.27)	-0.009 (0.43)	-0.034 (0.84)
West North Central	0.013 (0.89)	-0.013 (0.91)	-	0.010 (0.81)	-0.010 (0.57)	-0.001 (0.04)	-0.019 (1.27)	0.018 (0.94)	0.001 (0.08)	-0.028 (1.66)	-0.020 (0.83)	0.039 (1.01)	-0.003 (0.15)	-0.005 (0.11)
East South Central	-0.001 (0.06)	-0.011 (0.56)	-	0.008 (0.50)	0.028 (1.29)	-0.006 (0.92)	-0.005 (0.26)	0.011 (0.46)	-0.017 (0.95)	-0.005 (0.23)	-0.004 (0.15)	0.021 (0.42)	-0.000 (0.00)	-0.032 (0.58)
West South Central	0.037 (2.98)***	0.024 (1.87)*	-	0.039 (3.64)***	0.015 (1.05)	0.043 (3.26)***	0.014 (1.09)	0.046 (2.82)**	-0.014 (1.20)	0.014 (0.97)	-0.013 (0.62)	0.064 (1.93)*	0.039 (2.02)**	0.012 (0.32)
Mountain	0.041 (2.06)**	-0.005 (0.24)	-	-0.001 (0.08)	-0.002 (0.07)	0.013 (0.67)	0.013 (0.66)	0.026 (1.00)	-0.013 (0.68)	-0.010 (0.42)	-0.003 (0.09)	0.055 (1.05)	0.032 (1.06)	0.003 (0.04)
Pacific	0.040 (2.45)**	0.063 (3.77)***	-	0.016 (1.14)	0.034 (1.75)*	0.052 (3.00)***	0.034 (2.07)**	0.027 (1.25)	0.014 (0.85)	-0.013 (0.67)	0.027 (1.01)	0.083 (1.91)*	0.020 (0.77)	0.017 (0.37)
R^2	0.25	0.39	0.44	0.28	0.23	0.23	0.30	0.17	0.28	0.24	0.17	0.129	0.22	0.11
$\bar{R}^2$	0.14	0.30	0.05	0.17	0.12	0.16	0.20	0.05	0.17	0.13	0.05	0.004	0.10	-.03
F	2.28***	4.17***	1.12	2.59***	2.09***	1.98**	2.97***	1.43	2.53***	2.17***	1.39	1.04	1.92**	0.81
n of observations	137	137	28	137	137	137	137	137	137	137	136	137	137	137

*Signif. at .10 level; **signif. at .05 level; ***signif. at .01 level.

TABLE V

DETERMINANTS OF THE RATE OF CHANGE OF TOTAL COMPENSATION
1976-1977
(t-statistics in parentheses)

INDEPENDENT VARIABLE	CRAFT													
	Brick-layers	Carpen-ters	Cement Masons	Crane Op-erators	Electri-cians	Iron Workers	Laborers	Painters	Pipe-fitters	Plas-terers	Plumbers	Roofers	Sheet Metal Workers	Team-sters
Constant	0.041	0.073	0.076	0.061	0.051	0.069	0.066	0.037	0.040	0.057	-	-.017	0.058	0.112
Unemployment (1976)	-0.003 (2.09)**	-0.005 (2.90)***	-0.007 (1.68)*	0.001 (0.53)	0.002 (1.25)	-0.003 (2.00)**	-0.003 (2.05)**	-0.012 (0.58)	-0.001 (0.69)	-0.001 (0.25)	-	0.002 (0.50)	-0.002 (1.12)	-0.008 (1.78)*
% Change in Man. Wage (1976-77)	0.129 (0.84)	0.263 (1.68)*	0.425 (0.96)	0.075 (0.56)	0.181 (1.01)	0.19 (1.17)	0.194 (1.24)	0.140 (0.69)	0.316 (2.52)**	0.256 (1.41)	-	-0.191 (0.46)	0.156 (0.67)	0.516 (1.13)
% Change in Const. Act. (1976-77)	-0.001 (0.35)	0.0034 (1.11)	0.004 (0.79)	-0.004 (1.75)*	-0.001 (0.20)	-0.004 (1.16)	0.001 (0.15)	-0.004 (1.10)	-0.067 (2.07)**	0.001 (0.43)	-	-0.005 (0.68)	0.001 (0.60)	-0.004 (0.51)
% Change in Craft-Specific Const. Act. (1976-77)	-	-0.001 (0.985)	-	0.001 (0.68)	-	-0.000 (0.27)	-	-	0.00014 (2.35)**	-	-	-	-	0.003 (0.56)
Expectation of Public Sector Share (1972-79)	0.073 (1.56)	0.038 (0.80)	-0.058 (0.54)	-0.003 (0.09)	-0.023 (0.43)	0.057 (1.14)	0.016 (0.34)	0.043 (0.697)	-0.059 (1.56)	0.008 (0.16)	-	0.083 (0.66)	0.155 (2.20)**	0.043 (0.31)
% Change in Public Sector Share (1976-77)	0.001 (0.61)	0.002 (1.07)	0.007 (0.73)	-0.001 (0.99)	0.001 (0.62)	0.001 (0.34)	0.005 (3.55)***	0.001 (0.47)	-0.001 (0.68)	0.005 (2.94)***	-	0.002 (0.49)	0.005 (2.21)**	-0.004 (0.78)
Degree of Unionization	0.008 (0.38)	0.004 (0.216)	-0.000 (0.00)	-0.016 (0.84)	0.04 (0.65)	-0.009 (0.40)	0.005 (0.25)	-0.006 (0.22)	0.023 (1.27)	0.014 (0.56)	-	0.005 (0.08)	-0.004 (1.06)	-0.08 (1.26)
Relative Strike Frequency $(\frac{1976}{1971})$	-0.002 (0.34)	-0.008 (1.12)	0.011 (0.53)	0.004 (0.69)	0.007 (0.87)	-0.007 (0.92)	-0.006 (0.79)	0.006 (0.596)	-0.004 (0.70)	-0.008 (0.98)	-	-0.016 (0.78)	-0.010 (0.84)	0.004 (0.21)
Right-to-Work Law	-0.018 (1.65)*	-0.007 (0.60)	-	0.001 (0.14)	-0.011 (0.87)	0.009 (0.79)	0.019 (1.65)*	-0.027 (1.86)	0.011 (1.31)	0.008 (0.66)	-	0.007 (0.24)	-0.024 (1.42)	-0.02 (0.61)
Coordinated Bargaining	-0.002 (0.27)	0.002 (2.46)**	-	-0.001 (0.221)	-0.018 (2.12)**	-0.002 (0.17)	-0.009 (1.27)	-0.002 (0.14)	0.006 (0.97)	-0.008 (1.01)	-	0.019 (0.93)	-0.008 (0.72)	-0.025 (1.09)
New England	-0.011 (0.80)	-0.022 (1.45)	0.004 (0.18)	-0.024 (1.93)*	-0.011 (1.31)	0.045 (2.93)***	0.011 (0.75)	-0.026 (1.36)	-0.021 (1.83)*	-0.028 (1.71)	-	0.023 (0.61)	-0.519 (2.35)**	-0.024 (0.57)
Middle Atlantic	-0.003 (0.26)	-0.003 (0.26)	0.021 (0.74)	-0.001 (1.34)	-0.021 (0.76)	0.005 (0.41)	0.001 (0.11)	-0.19 (1.17)	-0.009 (0.87)	-0.017 (1.17)	-	-0.017 (0.49)	-0.034 (1.76)*	-0.027 (0.71)
East North Central	0.009 (0.69)	-0.005 (0.39)	0.003 (0.08)	0.077 (0.66)	-0.007 (1.37)	0.009 (0.645)	0.008 (0.61)	-0.002 (0.10)	-0.016 (1.46)	-0.005 (0.33)	-	0.045 (1.26)	-0.008 (0.40)	-0.034 (0.84)
West North Central	0.014 (1.02)	-0.012 (0.83)	-	0.011 (0.89)	0.027 (0.47)	-0.001 (0.03)	-0.017 (1.15)	0.189 (0.98)	0.006 (0.57)	-0.026 (1.57)	-	0.038 (1.00)	0.002 (0.00)	-0.006 (0.13)
East South Central	-0.001 (0.05)	-0.011 (0.58)	-	0.008 (0.51)	0.017 (1.27)	-0.006 (0.31)	-0.004 (0.25)	0.011 (0.45)	-0.017 (1.09)	-0.005 (0.23)	-	0.021 (0.42)	0.003 (0.00)	-0.031 (0.57)
West South Central	0.039 (3.13)***	0.024 (1.93)*	-	0.039 (3.72)***	-0.002 (1.19)	0.043 (3.24)***	0.015 (1.22)	0.047 (2.85)	-0.017 (1.17)	0.015 (1.04)	-	0.064 (1.92)*	0.041 (2.12)**	0.010 (0.29)
Mountain	0.041 (2.10)**	-0.0045 (0.23)	-	-0.009 (0.06)	0.029 (0.089)	0.013 (0.67)	0.013 (0.69)	0.026 (1.01)	-0.012 (0.77)	-0.009 (0.42)	-	0.054 (1.05)	0.033 (1.10)	0.002 (0.04)
Pacific	0.037 (2.25)**	0.061 (3.63)***	-	0.014 (1.02)	-0.011 (1.53)	0.051 (2.96)***	0.0380 (1.79)*	0.025 (1.15)	0.0027 (0.65)	-0.016 (0.83)	-	0.082 (1.88)*	0.012 (1.49)	0.019 (0.42)
% Change in Plumbers Wages (1976-77)	0.107 (1.89)	0.061 (1.04)	0.065 (0.95)	0.058 (1.21)	1.33 (2.03)**	0.004 (0.077)	0.117 (2.04)**	0.057 (0.77)	0.344 (7.43)***	0.099 (1.50)	-	0.007 (0.044)	0.231 (2.68)***	-0.065 (0.39)
R^2	0.26	0.394	0.47	0.292	0.256	0.232	0.32	0.17	0.51	0.251	-	0.13	0.26	0.11
$\bar{R}^2$	0.15	0.295	0.04	0.17	0.142	0.107	0.21	0.05	0.43	0.136	-	-0.003	0.15	-0.03
F	2.40***	4.006***	1.09	2.54***	2.25***	1.86**	3.11***	1.38	6.41***	2.198***	-	0.97	2.31***	0.76
n of observations	137	137	28	137	137	137	137	137	137	137	-	137	137	137

*Signif. at .10 level; **signif. at .05 level; ***signif. at .01 level.

TABLE VI

DETERMINANTS OF THE RATE OF CHANGE OF TOTAL COMPENSATION
1972-1973
ALL CRAFTS
(t-Statistics in Parentheses)

INDEPENDENT VARIABLE	COEFFICIENT	INDEPENDENT VARIABLE	COEFFICIENT
Constant	0.082	Bricklayers	-0.006
			(0.79)
Unemployment (1972)	-0.001		
	(3.06)***	Carpenters	0.007
			(0.93)
% Change in Man. Wage (1972-73)	-0.004		
	(0.05)	Cement Masons	Omitted
% Change in Const. Act. (1972-73)	0.004	Crane Operators	0.005
	(1.23)		(0.58)
Expectation of Public Sector Share (1972-79)	-0.001	Electricians	0.004
	(0.04)		(0.52)
% Change in Public Sector Share (1972-73)	-0.000	Iron Workers	0.006
	(0.04)		(0.76)
Degree of Unionization	-0.007	Laborers	0.004
	(0.90)		(0.46)
Relative Strike Frequency $(\frac{1972}{1971})$	-0.001	Painters	0.001
	(0.52)		(0.19)
		Pipefitters	-0.007
Right-to-Work Law	0.007		(0.91)
	(2.01)**	Plasterers	-0.002
Coordinated Bargaining	-0.002		(0.31)
	(0.86)	Plumbers	-0.007
New England	0.015		(0.94)
	(3.37)***	Roofers	-0.005
Middle Atlantic	0.000		(0.59)
	(0.04)	Sheet Metal Workers	0.001
East North Central	-0.012		(0.15)
	(2.63)***	Teamsters	0.000
West North Central	-0.009		(0.00)
	(2.07)**		
East South Central	-0.007	R^2	0.11
	(1.19)	$\bar{R}^2$	0.09
West South Central	0.016	F	7.19
	(3.89)***	n of observations	1860
Mountain	0.015		
	(2.32)***		
Pacific	0.012		
	(2.37)***		

*Signif. at .10 level; ** signif. at .05 level; ***signif. at .01 level.

TABLE VII

DETERMINANTS OF THE RATE OF CHANGE OF TOTAL COMPENSATION
1973-1974
ALL CRAFTS
(t-Statistics in Parentheses)

INDEPENDENT VARIABLE	COEFFICIENT	INDEPENDENT VARIABLE	COEFFICIENT
Constant	0.056	Bricklayers	0.012
			(1.35)
Unemployment (1973)	-0.000		
	(0.45)	Carpenters	0.014
			(1.52)
% Change in Man. Wage (1973-74)	-0.014		
	(0.25)	Cement Masons	Omitted
% Change in Const. Act. (1973-74)	0.000	Crane Operators	0.016
	(0.06)		(1.79)*
Expectation of Public Sector Share (1972-79)	0.022	Electricians	0.014
	(1.27)		(1.53)
% Change in Public Sector Share (1973-74)	-0.001	Iron Workers	0.015
	(0.49)		(1.66)*
Degree of Unionization	-0.018	Laborers	0.021
	(2.17)**		(2.32)**
Relative Strike Frequency $(\frac{1973}{1971})$	0.004	Painters	0.016
	(1.02)		(1.75)*
		Pipefitters	0.025
Right-to-Work Law	0.004		(2.71)*
	(1.03)	Plasterers	0.019
			(2.05)**
Coordinated Bargaining	-0.005	Plumbers	0.024
	(1.93)*		(2.64)***
New England	0.001	Roofers	0.019
	(0.21)		(2.14)**
Middle Atlantic	0.004	Sheet Metal Workers	0.025
	(0.94)		(2.72)***
East North Central	0.012	Teamsters	0.018
	(2.35)**		(1.98)**
West North Central	0.019		
	(3.65)***		
East South Central	0.025	R^2	0.08
	(3.77)	$\bar{R}^2$	0.06
West South Central	0.014	F	5.00
	(2.94)***	n of observations	1861
Mountain	0.030		
	(4.21)***		
Pacific	0.040		
	(6.42)***		

*Signif. at .10 level; **signif. at .05 level; ***signif. at .01 level.

TABLE VIII

DETERMINANTS OF THE RATE OF CHANGE OF TOTAL COMPENSATION
1976-1977
ALL CRAFTS
(t-Statistics in Parentheses)

INDEPENDENT VARIABLE	COEFFICIENT	INDEPENDENT VARIABLE	COEFFICIENT
Constant	0.043	Bricklayers	0.005
			(0.46)
Unemployment (1976)	-0.003		
	(3.92)***	Carpenters	0.018
			(1.66)*
% Change in Man. Wage (1976-77)	0.217		
	(3.33)***	Cement Masons	Omitted
% Change in Const. Act. (1976-77)	0.001	Crane Operators	0.011
	(1.00)		(1.06)
Expectation of Public Sector Share (1972-79)	0.036	Electricians	0.027
	(1.82)*		(2.51)**
% Change in Public Sector Share (1976-77)	0.002	Iron Workers	0.026
	(2.41)**		(2.49)**
Degree of Unionization	-0.000	Laborers	0.015
	(0.04)		(1.43)
Relative Strike Frequency $(\frac{1976}{1971})$	-0.002	Painters	0.014
	(0.75)		(1.31)
		Pipefitters	0.018
Right-to-Work Law	0.000		(1.48)
	(0.00)	Plasterers	0.009
Coordinated Bargaining	0.003		(0.88)
	(0.85)	Plumbers	0.021
New England	-0.008		(2.00)**
	(1.38))	Roofers	0.015
Middle Atlantic	-0.009		(1.38)
	(1.65)*	Sheet Metal Workers	0.008
East North Central	-0.002		(0.80)
	(0.41)	Teamsters	0.003
West North Central	-0.001		(0.25)
	(0.23)		
East South Central	-0.001	R^2	0.10
	(0.19)	$\bar{R}^2$	0.08
West South Central	0.025	F	6.43
	(4.67)***	n of observations	1808
Mountain	0.012		
	(1.45)		
Pacific	0.032		
	(4.57)***		

*Signif. at .10 level; **signif. at .05 level; ***signif. at .01 level.

TABLE IX

DETERMINANTS OF THE RATE OF CHANGE OF TOTAL COMPENSATION
ALL CRAFTS BUT PLUMBERS
1976-1977
(t-Statistics in Parentheses)

INDEPENDENT VARIABLE	COEFFICIENT	INDEPENDENT VARIABLE	COEFFICIENT
Constant	0.040	Bricklayers	0.004
			(0.34)
Unemployment (1976)	-0.002		
	(2.71)**	Carpenters	0.016
			(1.56)
% Change in Man. Wage (1976-77)	0.189		
	(2.82)***	Cement Masons	Omitted
% Change in Const. Act. (1976-77)	-0.001	Crane Operators	0.010
	(1.41)		(0.75)
Expectation of Public Sector Share (1972-79)	0.039	Electricians	0.025
	(1.92)*		(2.42)**
% Change in Public Sector Share (1976-77)	0.002	Iron Workers	0.025
	(2.35)**		(2.39)**
Degree of Unionization	-0.006	Laborers	0.139
	(0.61)		(1.32)
Relative Strike Frequency $(\frac{1976}{1971})$	-0.001	Painters	0.013
	(0.41)		(1.20)
		Pipefitters	0.017
Right-to-Work Law	-0.004		(1.57)
	(0.83)	Plasterers	0.008
Coordinated Bargaining	-0.000		(0.75)
	(0.00)	Plumbers	Omitted
New England	-0.015		
	(2.39)**	Roofers	0.013
			(1.23)
Middle Atlantic	-0.011	Sheet Metal Workers	0.007
	(2.02)**		(0.69)
East North Central	-0.001	Teamsters	0.001
	(0.21)		(0.13)
West North Central	0.002		
	(0.27)		
East South Central	-0.001	R^2	0.11
	(0.14)	$\bar{R}^2$	0.10
West South Central	0.029	F	7.06***
	(5.33)***	n of observations	1672
Mountain	0.013		
	(1.59)		
Pacific	0.029		
	(4.03)***		
% Change in Plumbers Wage (1976-77)	0.096		
	(4.01)***		

*Signif. at .10 level; ** signif. at .05 level; ***signif. at .01 level.

Footnotes

[1]H. G. Lewis, Unionism and Relative Wages in the United States, Chicago: University of Chicago Press, 1963, especially pp. 10-27.

[2]Alfred Marshall, Principles of Economics, eighth edition, London: Macmillan, 1927, pp. 385-386; J. R. Hicks, The Theory of Wages, second edition, London: Macmillan, 1963, pp. 241-246.

[3]Roger Bowlby, "Industrial Mobility of Construction Workers," in Annual Construction Industry Report, 1980, Office of Construction Service, U.S. Department of Labor, 1980, pp. 37-72.

[4]Sherwin Rosen, "Trade Union Power, Threat Effects, and the Extent of Organization," Review of Economic Studies, Vol. 36, No. 2 (April, 1969), pp. 185-196.

[5]Daniel Quinn Mills, Industrial Relations and Manpower in Construction, Cambridge, Mass.: MIT Press, 1972, pp. 70-74.

[6]Paul T. Hartman and Walter H. Franke, "The Changing Bargaining Structure in Construction: Wide-Area and Multicraft Bargaining," Industrial and Labor Relations Review, Vol. 33, No. 2 (January 1980), pp. 170-184.

[7]Donald E. Cullen and Louis Feinberg, "The Bargaining Structure in Construction: Problems and Prospects," Washington, D. C.: U.S. Department of Labor, Labor-Management Services Administration, 1980.

[8]Mills, op. cit.

[9]G. S. Maddala, Econometrics, New York: McGraw-Hill, 1977, pp. 322-326.

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CHAPTER IV

The Union-Nonunion Wage Interaction in Construction

During the decade of the 1970's nonunion construction activity grew rapidly both absolutely and relatively. Bourdon and Levitt write that "increases in union hourly rates in the late 1960's, driven by the high volume of construction demand, were a major cause of subsequent open shop growth" (p. 5). The causation, which they imply is consistent with microeconomic theory, is that as the cost of one factor of production, union labor, increases contractors have a greater incentive to substitute other factors of production, nonunion labor, for it.

If microeconomic theory's prediction is correct one ought to see either the proportion of work done by nonunion workers increase or else see unions reduce their negotiated wage increases in order to maintain their share of the market. Microeconomic theory, however, is not the only relevant theory.

In his work "The Balkanization of Labor Markets" Clark Kerr writes:

> Extensive discussions with craft union leaders and the employers dealing with them in the San Francisco Bay area indicate that these unions do not generally use their control over the supply of labor to force up wage rates. They employ it rather to adjust supply to demand once the wage rate is fixed. If the supply fall too short of demand, the employers are encouraged to introduce machinery or look to another craft for workers or even to nonunion men.

Kerr's widely quoted balkanization hypothesis developed from his contact with the construction industry suggests that union leaders are more interested in achieving a wage target than in having all union members employed or in maintaining their market share. Carried to its logical extreme this would imply that the market has absolutely no effect on union wage demands. Given that the necessary precondition of being

a union leader is to have followers, wage demands must certainly be tempered when the union's survival is threatened.

The most prolific writer on industrial relations in construction, D. Quinn Mills, has recently expressed doubt that construction union wage settlements have been tempered by economic realities:

> It would be too much to conclude that the inflationary problem in construction collective bargaining has disappeared. The recent levels of settlements nationally, while acclaimed as "moderate" by many economists, should be viewed in context. Settlements averaging 7 percent in an environment of massive unemployment do not augur well for the future, when the volume of construction activity accelerates. (p. 80)

Mills' implication is that Clark Kerr was correct, i.e., construction union wage demands are set without regard for their impact on union member employment.

Have the business and popular press articles which have periodically reported negotiated wage reductions in construction been published because they were man-bites-dog curiosities? Is the growing nonunion sector having an impact on union wage demands? It has been impossible to answer this question largely because systematically collected data on the size and pay of the nonunion construction sector has been unavailable. In 1972, however, the Bureau of Labor Statistics began including the construction industry in their Industry Wage Survey Program. Such surveys have since been conducted in 1972, 1973, 1976 and 1977. While the cities and crafts surveyed have varied across the survey, there is now a set of union and nonunion data available on which to test the microeconomic theory hypothesis vs. the balkanization hypothesis.

Before proceeding with such tests, a major note of caution is in order. The Bureau of Labor Statistics collects data on union and nonunion craftsmen for the following crafts: bricklayer, cement mason,

carpenter, electrician, ironworker, laborer, painter, pipefitter, plumber, roofer and sheet metal worker. Bourdon and Levitt have clearly demonstrated that these labels connote different skills and skill levels in the union and nonunion sectors (pp. 57-78). A nonunion sheet metal worker may occasionally do work completely out of his craft such as carpentry, while a union electrician almost never does nonelectrical work. A union journeyman electrician is likely to be skilled in the full set of wiring tasks on a job while the nonunion electrician may be skilled in a narrow range of tasks. Furthermore, the kinds of tasks that a nonunion carpenter performs may vary greatly from city to city.

The Bureau of Labor Statistics has followed their normal procedure of standardizing these craft classifications from city to city. Their efforts cannot begin to approximate the standardization of craft definitions that has arisen out of decades of craft union jurisdictional dispute settlement. Hence, part of what on the surface appears to be union-nonunion wage difference may in fact reflect differing prices for differing services.

Likewise there is great reason to suspect that productivity differences exist between union and nonunion craftsmen. Such productivity differences could arise from variations in workman age, experience, and training or from the characteristics of the firms which employ the workers such as supervision, mechanization and work organization. Unfortunately only one empirical study has been done on these productivity variations, a case study by Allan Mandelstamm in 1965. Mandelstamm found union craftsmen to be the more productive. At this time there is no basis for generalization about the relative productivity question.

Considerable caution must be exercised in using the B.L.S. generated construction wage data. The relative wage differentials it reports may reflect much more than the presence or absence of unionization. With that caution we will proceed to review the one previous study which is relevant and to specify and test our own model.

Prior Work

Sobotka (p. 73, 1952) and Shulenburger (p. 118, 1974 and p. 404, 1978) have earlier used the proportion of craftsmen organized to account for variation in union wages. Sobotka found the ratio of union wages in six crafts to laborer wages to be positively related to the proportion of the craft organization. He failed, however, to take any of the correlates of unionization which might have affected the wage ratio into account in his study. Shulenburger's dependent variable was the change in negotiated construction union wages. In a statistically controlled study he found neither the proportion of a craft organized nor the change in the craft's membership to be consistently significantly related to wage change. His measure of unionization was derived from union reported membership statistics generated through Landrum-Griffin reporting requirements. There is considerable reason to believe that these statistics are not accurate reflections of union membership. Even were the statistics accurate, his formulation of the variable, i.e., reported union membership divided by total construction employment in the city implicitly assumes that 100% of all union craftsmen were employed. This is highly unlikely. His estimate of the unionization wage relationship is thus only a very rough approximation of the true relationship.

Stephen Welch (1980) published the first and only study to use the new BLS data to test the impact of union organization on the differential between union and nonunion construction wages. The model which is tested is:

Equation 1: $$\ln W_{ij} = \alpha_0 + \alpha_1 U_{ij} + \alpha_2 U_{ij}^2 + \beta_2 T_2 + \ldots + \beta_6 T_6 + \gamma_2 C_2 U_{ij} + \ldots \gamma_{15} C_{15} U_{ij} + \varepsilon_{ij}$$

where $\ln W_{ij}$ is the natural log of the ratio of union to nonunion wages;

U is the ratio of unionized to total union and nonunion craftsmen employed;

T is a dummy variable for the trade;

and C is a dummy variable for the city.

He used only 90 of the observations available from the 1973 BLS survey. These observations included six crafts in fifteen cities. His study excludes four crafts for which data were reported. Table 1 below reproduces his equation as estimated.

His results with their highly significant coefficients on unionization, clearly show the proportion of workers organized to be directly related to the log of the union nonunion wage ratio. Taking the partial of his dependent variable with respect to unionization, setting it equal to zero, and solving for U shows that the maximum wage ratio is achieved when 65.68% of the craft is organized. Given the nonlinear form utilized unionization rates greater or less than 65.68% would result in lower union-nonunion wage ratios.

Welch's study suffers from two flaws, data inadequacy and model misspecification. The data inadequacy occurs because the BLS survey deals with wages of employed workers and not compensation. As Welch points out

TABLE 1

Regression Results: Union-Nonunion Wage Ratio on Extent of Trade Union Organization and Selected Dummy Variables (N = 90)

Variables	Estimated Coefficients	t-Statistics
Constant	0.00962	0.069
U_2	1.15420	2.293**
U^2	-0.87755	-2.107**
T2	0.06647	1.141
T3	0.06550	1.131
T4	0.00495	0.084
T5 (sheet metal)	0.12463	2.185**
T6 (laborers)	0.11329	2.031**
C2U	0.02266	0.273
C3U	0.06495	0.760
C4U	0.01161	0.122
C5U	0.04150	0.506
C6U	0.13785	0.818
C7U	0.04104	0.344
C8U	0.03116	0.256
C9U (Miami)	-0.15626	-1.935*
C10U	-0.06185	-0.383
C11U	-0.05317	-0.501
C12U	0.05892	0.612
C13U	-0.12718	-1.246
C14U (Denver)	-0.15700	-1.957*
C15U	-0.10796	-1.066

$\bar{R}^2 = 0.3653$

S.E.E. = 0.15244

F = 1.92**

*Significant at the .10 level

**Significant at the .05 level

(page 156), prior research has shown that construction fringe benefits rise with negotiated wages (Gustman and Segal, 1972) and that nonunion wage supplements are smaller than union supplements (Northrup and Foster, 1975). Given this problem (which cannot be corrected with the available data) the peak union-nonunion wage ratio point cannot accurately be calculated. In addition, the BLS data report only employed craftsmen. Ideally, the unionization ratio would be calculated as total construction union members divided by total construction craftsmen. The use of "employed" rather than "total" carries with it the implication that equal proportions of union and nonunion craftsmen are unemployed. No tests of this implication are available.

The misspecification problem is serious. Several factors which might affect the wage ratio are not included in his model. These include institutional, demand, and supply factors which might have impacts on the wage ratio but which are independent of the level of unionization. Failure to include them runs the risk of attributing their impact to the unionization variable or other of his variables, which might be correlated with them. In the section below we more completely specify the model and estimate it over all four time periods for which data is now available.

Model Specification

Welch's basic model which permits a linear or curvilinear relationship with unionization to emerge from the data accommodates existing theory well. We expand the basic Welch model to Equation 2 below.

Equation 2: $$\ln W_{ij} = c_0 + c_1 U_{ij} + c_2 U_{ij}^2 + c_3 V_j + c_4 R_j + c_5 M_{ij} + c_6 B_{ij} + c_7 C + \ldots + c_n C + \varepsilon_{ij}$$

lnW--natural log of union ÷ nonunion craft wages

U--percent unionized

V--percent change in the volume of construction activity since the previous year

R--general unemployment rate

M--average manufacturing wages divided by craft wages

B--dummy variable for coordinated bargaining participation

C--craft union dummy variables.

Our model modifies Welch's by explicitly including demand, supply, and institutional forces which are hypothesized to affect the union-nonunion wage ratio. Welch's model used city dummy variables as a composite proxy for all of these three effects. This masks the effects and is unnecessary as the effects can be measured directly.

Research has consistently found union membership and bargaining power to be consistently positively related to demand. Thus the empirical work suggests that demand is directly related to the size of the union nonunion wage differential. Strong demand should increase union more than nonunion wages through the increased bargaining power route. We measure changes in demand here by the percentage change in the total volume of construction activity. As before, the F. W. Dodge measure of such activity is utilized. This variable is omitted in the 1972 regression as 1971 F. W. Dodge data are unavailable.

Supply is measured by the city's unemployment rate. This, of course, reflects the volume of labor available for construction. As such it better reflects the quality of labor available to the nonunion sector where

only skill barriers to entry exist. Thus as the unemployment rate increases nonunion construction wages should be suppressed and the differential between union and nonunion wages wider.

Roger Bowlby (1980) found that construction workers earn a substantial portion of their annual incomes from nonconstruction activity. Indeed 37 percent of construction workers' nonconstruction annual incomes is derived from work in the manufacturing sector alone. This sector is nearly twice as large a source of construction worker earnings than any other nonconstruction sector. When deciding whether to work in the manufacturing sector or construction sector the relative wages of the two sectors must be an important consideration. We include the ratio between a specific craft's negotiated wages and the manufacturing wage rate as an independent variable to capture this effect. Since most construction workers who come out of manufacturing probably go into the nonunion construction sector, that sector and the nonunion sector are part of the same labor market. Thus nonunion construction wages must be set just high enough to make construction a better alternative for workers than manufacturing.

This line of argument suggests that nonunion construction wages are established jointly with manufacturing wages. We thus expect this variable to be inversely related to our formulation of the dependent variable, i.e., the better the unionized craft performs relative to the manufacturing sector the greater the disparity between union and nonunion construction wages.

The dummy variable for coordinated bargaining reflects this institutional arrangement. One presumes that both unions and contractors agree to this arrangement in the belief that it is in their self

interest to do so. We include the variable control for this arrangement but adopt no specific hypothesis about its impact on our dependent variable.

Finally craft dummy variables are included in the equation. These variables capture craft specific institutional factors. Some crafts bargain more frequently, have wider labor markets, are leaders, etc.; these factors would have an independent impact on the dependent variable.

Proportion unionized and proportion unionized squared are formulated as Welch formulated them. Should a significant positive coefficient be estimated for the unionization variable support will exist for the microeconomic, competing factor argument. Should the coefficient on the unionization variable be insignificant, the balkanization hypothesis will be supported.

The most consistent set of crafts and cities were sampled in 1973 and 1977. This enables us to examine the impact that the change in unionization had on the wage ratio. The 1977 equation includes this variable, percent change in unionization since 1973, as an additional independent variable. A significant positive coefficient would support microeconomic theory, while an insignificant sign would support balkanization.

Time Periods and Sample

We will estimate the equation for each of the four time periods, 1972, 1973, 1976, and 1977 which the B.L.S. has surveyed to date and will include every craft surveyed. The set of cities differ across years and crafts differ across years and within time periods. Our four equations will therefore vary in the number of observations across periods and the number of craft dummy variables included.

The assortment of years in which surveys were made gives us an opportunity to analyze the effects of wage controls on the wage ratio; 1972 and 1973 were control years while 1976 and 1977 were not. We hypothesize that a smaller amount of the variations in the dependent variable will be accounted for during the controls years. This is consistent with the announced control period intention to reestablish traditional relationships.

Discussion of Findings

Table 2 lists the regressions as estimated. The regressions clearly support the balkanization thesis. In no case is there a significant coefficient on the unionization squared variable or the percent change of unionized variable. The only significant coefficient on the unionization variable is in the 1977 regression and that coefficient is of the wrong sign. Simply stated, the evidence presented here is inconsistent with the thesis that the level, or changes in the level, of unionization have an impact on the ratio of union to nonunion wages in construction.

More complete specification of the model illustrates that Welch's finding of a significant relationship was a result of omission of important variables. This finding was foreshadowed by Welch's experimentation with his own model. The first model he reported which included only U and U^2 had coefficients on U and U^2 which were significant at the .01 level. When he added city and craft dummy variables the significance level on the union variable coefficients dropped to the .05 level.

It is unlikely that the lack of significance of unionization is due to a limited range problem. The mean percentage unionized in 1977 for the sample was 68.4%, with observations ranging from 4.7% to 99.6%. Similarly, the mean percent change in unionization from 1973 until 1977

TABLE 2

Dependent Variable: Natural Log of Union Nonunion Craft Wage

Variable	Year 1972	1973	1976	1977
Coordinated Bargaining	-.070 (1.47)	-.045 (.04)	.036 (.54)	-.027 (.58)
% Unionized	.544 (.73)	.339 (.65)	.210 (.55)	-.501 (1.67)*
(% Unionized)^2	-.654 (1.10)	-.357 (.84)	-.389 (1.12)	.092 (.39)
1973-1977 % Change in Unionized	-	-	-	.051 (.82)
Manufacturing Wage Ratio	.209 (.59)	-.568 (2.20)**	-1.055 (5.03)***	-.021 (.089)
Percent Change in Volume of Construction	-	.232 (2.53)**	.072 (1.23)	.133 (1.78)*
Unemployment	.015 (.94)	-.005 (.36)	-.016 (1.10)	.037 (2.014)**
Bricklayers	-.301 (2.042)***	-.242 (3.24)***	-.024 (.23)	-.157 (2.02)**
Cement Masons	-.35 (.46)	.078 (1.23)	.136 (1.56)	.018 (2.58)**
Electricians	.35 (.50)	.073 (1.27)	.172 (2.25)**	.105 (1.91)*
Iron Workers	-	-	.254 (2.14)**	-
Laborers	-.076 (.80)	.228 (3.16)***	.396 (6.18)***	.007 (1.91)*
Painters	-	-	.198 (2.87)**	-
Pipefitters	.052 (.57)	.064 (.67)	-.062 (.77)	.016 (.10)
Plumbers	-.050 (.64)	.032 (.54)	-.029 (.41)	.065 (.29)
Roofers	.054 (.36)	.038 (.64)	-.001 (.00)	-.012 (1.11)
Sheet Metal Workers	.043 (.47)	.167 (2.88)***	.066 (.07)	.119 (2.15)**
Constant	.216	.642	.909	.295
$\bar{R}^2$	.18	.31	.76	.42
F	1.83*	3.84***	6.96***	3.68***
N	48	98	30	64

t-statistics are in parentheses.
*Significant at .10 level.
**Significant at .05 level.
***Significant at .01 level.

was -5.2% with a range of from 92.9% decrease to a 116.4% increase. Unionization on average in 1973 was 63.2%.

The large statistically significant negative coefficient on unionization in 1977 is hard to explain. Taken literally it implies that the union-nonunion wage ratio was 50.1% smaller when 100% of the workforce was organized. Given the significance of only 10%, the small sample, and the lack of theory to support the sign, one is tempted to treat the coefficient as a statistical aberation. It does, however, fit into a pattern. For the years 1972, 1973, 1976 and 1977 the coefficients on percent unionized are .544, .339, .210, and -.501, respectively. Admittedly, the first three coefficients are not significant at traditional levels. The pattern of continual decrease might suggest that the best organized locals either moderated wage demands for competitive reasons or that nonunion contractors in their labor markets were willing to pay nearly union wages to get workers to work nonunion. We see this pattern as very weak evidence of a movement back toward an equilibrium.

In 1973 and again in 1976 the manufacturing wage ratio took on a statistically significant negative sign. In the other two years the coefficients were statistically insignificant. This finding is consistent with the argument that nonunion construction wages and manufacturing wages are set in the same labor market.

In all three years for which change in construction volume data was available a positive coefficient was estimated. In 1973 and 1977 the coefficient was statistically significant. Construction unions are apparently able to convert increased demand into a wider wage margin over nonunion workers.

The labor supply variable, unemployment, had the expected significant positive sign only in 1977. An insignificant coefficient was estimated for the other two periods. General labor supply looseness thus contributes to the union sector's differential, but the one out of four time periods for which this happens makes the empirical association quite tenuous.

In no case did coordinated bargaining have a significant impact on the wage ratio. Perhaps there is no practical significance to formal coordination. The communications network of craft unions may well accomplish the same end as does formal coordination.

The craft pattern is quite mixed. The bricklayer coefficient is significant three times, positive in 1972 and negative in 1973 and 1977. This may only reflect a repetitive two-year bargaining pattern.

During the wage control years 1972 and 1973, 18% and 31% of the variation in the dependent variables were accounted for. In the post-controls years, 1976 and 1977, 76% and 75% of the variation were explained. The controls were intended to replace market and institutional forces with "order." They apparently succeeded. No other major pattern of variation is apparent in the independent variables' coefficients across the controls-market era.

Discussion

The very limited set of data available support the balkanization notion. Craft unions do not appear to respond to loss of market by reducing their wage premium over unorganized workers. This finding is bolstered by the apparent interaction of manufacturing and nonunion craft wages. Craft unions can apparently tolerate even high general

unemployment without lowering the barriers around their wages. Their bargaining power rises and falls with construction demand in a manner which is consistently reflected in their relative wage advantage.

Even though our results are consistent across time, we choose not to generalize to other time periods or to all crafts within the same time periods. The largest set of observations in any of our regressions was 98. This is a very small fraction of the total universe and was not randomly selected by the B.L.S. from the universe.

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CHAPTER V

Discussion

Wage determination in construction in the 1970's has been examined to the extent permitted by the data. Our findings certainly confirm the suspicion that the wage setting relationship here is more complex than that in the remainder of the economy. Below we summarize our separate findings and apply them to an evaluation of the wage control program.

Demand

Demand, as measured in this study and in Shulenburger (1974), is seldom significantly related to wage change in the organized sector. Shulenburger resorts to using housing starts as a proxy for the total volume of building construction activity. The failure to find significance there is at least partially related to the weakness of the proxy.

Such is not the case in the current study; no proxy is used. For perhaps the first time, researchers were able to use the F. W. Dodge Division of McGraw-Hill, Inc. construction volume data. Neither the total volume measure nor the craft specific volume submeasures are significantly related to wage change.

This finding is consistent with an extreme balkanization thesis, i.e., craft unions blindly set and bargain successfully for wage targets. No concern is shown for membership employment in setting targets, and union contractors fail to interject volume considerations into the wages fixed at the bargaining table. Is construction demand so price inelastic that the level of wages is unrelated to the strength of demand?

We are not yet convinced that this is the case. We hesitate because the F. W. Dodge volume figures do not translate directly into men and women on the job. The lead time from award announcement to work initiation and work completion is highly variable by craft involved and by city, and, probably, over time also. The number of manhours that a given dollar volume project will translate into also varies along the same dimensions. The lack of one-to-one temporal, spatial and craft tracking of the volume/manhours relationship could result in a failure of the variable to be statistically significant, even if wage change is related strongly to demand.

Alas, the Dodge figures are the best currently available for use as a proxy for manhours demand. DOL's Office of Construction Services is in the early stages of exactly specifying the dollar-volume/manhours relationship for public projects in five cities. Perhaps this project in time will provide a data base which will permit a definitive test of the relationship between demand variation and wage change in construction.

Supply

Excess labor supply as measured by the unemployment rate consistently impacts on union wages as was predicted. For 1977 the coefficient in the intercraft model suggests that a one percentage point increase in employment would reduce the change in negotiated wages by three-tenths of a percentage point. A ten percent general unemployment rate would reduce negotiated wage change by three percentage points. In the individual craft regressions the coefficient is significant and negative for eight of the fourteen crafts. Labor supply changes apparently have the effect predicted by micro-economic theory.

In the union-nonunion wage ratio study the unemployment rate has a significant positive coefficient in one of the four time periods. In the other periods its coefficient is insignificant. This significance in the post-control period indicates that unemployment has the stronger wage depressing impact on nonunion wages.

Nonmarket Forces

Contour-type explanations of wage change are included in our models. The negotiated wage change models for 1976-77 use plumbers' wage change as an independent variable. We find that plumbers' wage change is significantly related to wage change for all crafts in the overall equation and for five subcontractor crafts in the craft equations. This, coupled with some statistical evidence that plumbers' wages are not simply a composite of unspecified forces, leads us to believe that the plumbers may have some status as a key craft. We cannot reject the hypothesis that imitative behavior is important in wage setting in construction.

Strong evidence that something in addition to market forces drives construction wages appears in the union-nonunion wage study. There the union-nonunion wage ratio is unaffected by the widespread declines in unionization. When organizations experiencing threats to their survival do not compromise, the balkanization thesis is more palatable.

Wage Control

Wage control effects appear in several instances in our work. In the organized sector's wage equations the 1972-73 control year equation is an apparent anomaly; none of the craft coefficients have significant signs. This contrasts sharply with later years. This lack of craft dummy significance is consistent with a wage control process which treats

all crafts alike. It is also not consistent with Mills' (1980) view of the wage control effort which ". . . so laboriously straightened out in the period 1971-74 . . ." the structure of compensation in construction (p. 86).

The 1973-74 regression, covering the last of the wage control period, does have several significant craft coefficients. Among those significant coefficients are large positive coefficients for plumbers, pipefitters, iron workers, and sheet metal workers. These crafts are among the highest ranked of all crafts in total compensation. A positive increment of 2.5 percentage points for plumbers and pipefitters relative to carpenters, the base craft, does not appear consistent with "straightening out" the structure of compensation.

As judged by the coefficient on the labor supply variable, unemployment, the wage control period did disrupt the operation of the labor market. For 1976-77, eight of the individual craft regressions have the expected, significant negative sign on unemployment, i.e., loose labor markets depress wage change. For 1972-73 and 1973-74 there are only four significant coefficients in total. Similarly, the overall regression for 1976-77 has a highly significant negative coefficient on unemployment while the 1972-1973 regression has a significant negative coefficient which is one-third the size of the 1976-77 coefficient. The 1973-74 regression has an insignificant coefficient on unemployment. Thus, during the period of controls, the one market force which consistently held wages in check, unemployment, was nearly ineffective.

Common practice would be to substitute the mean values of the independent variables for 1972-73 and 1973-74 into the 1976-77 equation to obtain an estimate of what wage increases would have been had controls

not existed. We chose not to do this because of the low predictive value ($\bar{R}^2$ = .08) of our 1976-77 regression. Since this regression predicts wages for its own time period so poorly, it is unrealistic to believe it can provide useful subjunctive information about the controls period.

From the union-nonunion wage ratio study further evidence that the controls altered market forces emerges. Only four craft dummies are statistically significant for the 1972 and 1973 time period, while nine coefficients are significant for 1976 and 1977. This is consistent with the 1972-73 negotiated wage regression in which no individual craft effects emerge. Wage control in the early period apparently flattened the dispersion of wage change.

The total explanatory power of the wage ratio regressions also varies across the control-noncontrol period. For the four years, 1972, 1973, 1976, and 1977, the adjusted R^2's are .18, .31, .76, and .42, respectively. During the controls only about one-half as much variance can be accounted for as in the post-control period.

Because of the higher explanatory power of the post-controls regression we are able to estimate the impact of controls on the union-nonunion wage ratio. We do so by substituting the mean values from 1972 and 1973 into the 1977 regression equation. We chose the 1977 equation for this purpose because it was estimated with more than twice as many degrees of freedom as the 1976 equation. The results are given in the table below.

Impact of Controls

Year	Predicted Wage Ratio	Actual Wage Ratio	Percent Difference
1977	1.409	1.419	+ .7%
1972	1.282	1.489	+16.7%
1973	1.195	1.445	+17.3%

As can be seen from the table, the 1977 equation fits that year's data extremely well. For 1972 and 1973 wage controls increase the union-nonunion wage advantage by about 17%. Controls thus appear to have been perversely effective in increasing controlled craft union wage increase relative to uncontrolled and wage board controlled craft nonunion wages.

The size of this perverse impact is quite large. In order to check it we utilize the 1972 and 1973 equations to predict the 1977 wage ratio. The 1972 equation predicts that the 1977 wage ratio would have been 10.2% greater had controls existed in 1977, while the 1973 equation predicts a 17.7% higher ratio.

Each of the equations thus tells the same story; controls served to increase the union-nonunion wage advantage. There are at least three possible explanations for this: 1) controls really did benefit union craft workers more than nonunion craft workers, 2) structural changes occurred between the controls period and 1977 which the model did not capture, and 3) the relatively small samples are not representative of the whole. In evaluating these options one should recall that our model includes the most prominent structural change, the reduction in unionization. We simply cannot evaluate option three until a wider selection of data is made available.

Data Limitations

Although only twenty-one years of consistent construction industry wage data now exist, some interesting insights could probably be gained through longitudinal modeling of the data. Prediction of the future from cross sectional estimation is risky as witnessed by the near futile attempts to develop macroeconomic models from such studies. We are unable to develop such models because construction demand data is available only for 1972-1980.

The F. W. Dodge Division of McGraw-Hall, Inc. provided the 1972-80 demand data which we utilized here. Such data are available from F. W. Dodge for the 1960-72 period. We were financially unable to purchase the data. Its approximate $100,000 price may always keep it beyond the reach of researchers.

Another limitation of this study is the method of including strike activity in the models. We simply use the city wide, all industry strike data which B.L.S. publishes for SMSA's as a proxy for the labor relations climate of the city. It would obviously be better to include measures of the existence and magnitude of specific construction craft strikes in the craft specific models. Overall craft strike measures should be used in aggregate models. We did not use such strike measures because the data was unavailable to us. The Bureau of Labor Statistics compiles such disaggregate data but would not release it to us for reasons of confidentiality. While understanding the position of B.L.S. concerning certain court decisions, we do not understand why data on such clearly public events as strikes need to be collected under a promise of confidentiality. The B.L.S. has a rich set of data on construction labor relations which it has gone to great expense to collect;

we trust that they will find a way to make it available to researchers in the future.

Conclusion

We apologize for the many times we have had to "make do" with existing measures. What is needed in order to fully understand wage setting in this sector of the economy is a consistent time series of supply, demand, and institutional measures dating back to at least 1960. The unavailability of craft specific strike data for the entire period, of volume data for 1960-1972, and of nonunion wages for all but a few crafts and time periods are hurdles that the best statistical imagination cannot overcome.

In spite of these limitations, a picture of construction wage determination is becoming clearer. The market clearly makes a difference, but its effects are filtered through a very heavy institutional screen. Undoubtedly, extreme market segmentation, balkanization, is too rigid a description of the market as is the characterization of the market as a bourse.

Three findings stand out: 1) the variations in the total volume of construction activity have little impact on negotiated wages, 2) declines in the proportion of the work force organized have no impact on the ratio of union to nonunion wages, and 3) wage controls disrupt the operation of market forces on construction wages and may even have operated to increase the union-nonunion wage ratio. Each of these findings has been appropriately hedged in the text above. Each of these findings deserves further study.